

HOST SPECIFICITY TESTS OF AN EGG PARASITE, *EDOVUM*
PUTTLERI (HYMENOPTERA: EULOPHIDAE), OF THE
COLORADO POTATO BEETLE, *LEPTINOTARSA*
DECEMLINEATA (COLEOPTERA: CHRYSOMELIDAE)

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Abstract.—In host-specificity tests conducted in our laboratory with a eulophid egg parasite, *Edovum puttleri* Grissell reared from *Leptinotarsa undecimlineata* (Stål) collected in Columbia, South America, the parasite successfully parasitized eggs of the Colorado potato beetle, *L. decemlineata* (Say), a previously unrecorded host. Eggs of ten species of coccinellids and eight species of chrysomelids were exposed to the parasite; however, none was found acceptable except for an occasional egg of *Labidomera clivicollis* (Kirby).

In February and March 1980, Ben Puttler surveyed for and collected a species of eulophid (Eulophidae: Entedontinae: Entedontini) from Colombia, South America. This species was reared from eggs of *Leptinotarsa undecimlineata* (Stål), a beetle that does not occur in the Nearctic but is widely distributed in the Neotropical Region. Specimens of the parasite submitted for identification were examined by E. E. Grissell, who concluded after a further study and in consultation with Z. Bouček that the parasite represented a new genus and species which he described as *Edovum puttleri* Grissell (Grissell, 1981). Initially, *E. puttleri* had been misplaced in the genus *Emersonopsis* and was referred to by Sánchez (1973) and Pasada and Garcia (1976).

The primary purpose of our collecting *Edovum puttleri* was to determine whether the parasite might accept eggs of the Colorado potato beetle, *Leptinotarsa decemlineata* (Say), which does not occur in Colombia, as a host for oviposition and development. If *L. decemlineata* proved acceptable, it would also be necessary to establish the parasite's relationship to other species of Nearctic Chrysomelinae (Chrysomelidae), the subfamily in which *Leptinotarsa* spp. are placed (Wilcox, 1972; Riley and Enns, 1979). We also wanted to know the parasite's reaction to our native species of Coccinellidae. Eggs of these beetles are similar in color, relative size, and shape and are usually laid in clusters (masses) on exposed leaf surfaces of their respective host plants, as are eggs of a number of subfamilies of Chrysomelidae.

Because of the paucity of information on this parasite, we conducted host-specificity tests in an attempt to examine its host range and to determine whether it would parasitize eggs of other spp. of Coccinellidae, including predaceous species. Analogous studies were conducted by Angalet et al. (1968) and Schroder (1979)

before the release of exotic natural enemies against the Mexican bean beetle, *Epilachna varivestis* Mulsant.

METHODS AND MATERIALS

Before specificity tests could be conducted, a laboratory colony of the imported parasite had to be established, if possible, on *L. decemlineata* because its original host, *L. undecimlineata*, does not occur in the United States. In our quarantine facility, eggs of *L. decemlineata* were exposed to adult parasites that emerged from imported eggs. Female parasites were readily attracted to the eggs of *L. decemlineata*, oviposited, and the progeny successfully completed development on the new host. Reproduction was adequate and a parasite colony was established on our laboratory culture of *L. decemlineata*.

The potential hosts tested (and the host plants on which they occurred as adults) were all collected in the spring and early summer of 1980 in the vicinity of Columbia (Boone County) Missouri (Table 1). Phytophagous species were placed in either 0.275- or 0.55-liter ice cream cartons containing bouquets of their respective host plant and subsequently covered with a petri dish lid. Predaceous species were treated similarly, except that they were supplied with either green peach aphids, *Myzus persicae* (Sulzer), or pine needle scale, *Chionaspis pinifoliae* (Fitch), to correspond with their preferred food source. The former was available from infestations on potatoes in the laboratory greenhouse and the latter from local infestations on pine. The ice cream cartons were checked daily for eggs of these coleopterans for use in subsequent testing.

Twenty-four- to 48-h-old egg masses were used in the specificity tests. This time element corresponded with the age of the *L. decemlineata* eggs used to maintain the parasite colony. Each test on a particular species was repeated 3–5 times with 1–10 egg masses (range 10–30 eggs/mass) in either a 3-dram shell vial or 10-cm petri dish. Ten to 15 female parasites were placed in the units with the eggs and observed for ½ to 1 h; then an egg mass of *L. decemlineata* was inserted and the unit observed for an additional 15 min. The *L. decemlineata* eggs were then removed and the parasites left with eggs of the test species for 24 h. Parasites were then removed, and the eggs of the test species and those of *L. decemlineata* were held until eclosion or development of the parasite. All tests were conducted in the laboratory at 26°C and 50% RH with a photoperiod of 16L:8D.

RESULTS AND DISCUSSION

During the observational period, the parasites were not strongly attracted to any of the eggs of the test species except *Leptinotarsa decemlineata* (Table 1). Random encounters were observed, but there was no apparent stimulus to oviposit, except for a weak response to *Labidomera clivicollis* (Kirby). In contrast, when *Leptinotarsa decemlineata* eggs were inserted in the units, parasites were readily attracted to them, oviposition was observed, and development was successful. Even after the eggs of the test species had been exposed to the parasite for 24 h, parasitization was not evidenced except for parasitism of an occasional *L. clivicollis* egg; only 2 (<1%) adult parasites were reared from ca. 400 eggs exposed.

These results clearly indicate that *E. puttleri* has a restricted host range, with probable specificity to Chrysomelidae of the genus *Leptinotarsa* or perhaps some

Table 1. Chrysomelid and coccinellid species whose eggs were tested as potential hosts of *Edovum puttleri* (++++ = readily acceptable; + = rarely acceptable; - = not acceptable).

Species	Host Plant or Association	Accepted Host
	Chrysomelidae	
	Chrysomelinae	
	Doryphorini	
<i>Leptinotarsa decemlineata</i> (Say)	<i>Solanum tuberosum</i> L. (potato)	++++
<i>Labidomera clivicollis</i> (Kirby)	<i>Cynanchum laeve</i> (Michx.) Pers. (climbing milkweed)	+
<i>Zygogramma suturalis casta</i> (Rogers)	<i>Ambrosia artemisiifolia</i> L. (common ragweed)	-
	Chrysomelini	
<i>Chrysomela knabi</i> Brown	<i>Salix babylonica</i> L. (weeping willow)	-
<i>Gastrophysa cyanea cyanea</i> Melsheimer	<i>Rumex crispus</i> L. (curly dock)	-
	Galerucinae	
<i>Pyrhalta luteola</i> (Müller)	<i>Ulmus</i> sp. (elm)	-
	Criocerinae	
<i>Lema trilinea trilinea</i> White	<i>Datura stramonium</i> L. (Jimson weed)	-
	Cassidinae	
	Stolaini	
<i>Chelymorpha cassidae</i> (F.)	<i>Ipomoea</i> sp. (morning glory)	-
	Coccinellidae	
	Coccinellinae	
	Coccinellini	
<i>Hippodamia tibialis</i> (Say)	Predaceous on aphids	-
<i>H. convergens</i> (Guérin-Ménéville)	Predaceous on aphids	-
<i>H. parenthesis</i> (Say)	Predaceous on aphids	-
<i>Coccinella novemnotata</i> (Herbst)	Predaceous on aphids	-
<i>C. transversoguttata</i> (Falderman)	Predaceous on aphids	-
<i>Coleomegilla maculata</i> (De Geer)	Predaceous on aphids	-
<i>Anatis</i> sp.	Predaceous on scales	-
<i>Adalia bipunctata</i> (L.)	Predaceous on scales	-
	Chilochornini	
<i>Chilochorus stigma</i> (Say)	Predaceous on scales	-
	Epilachninae	
<i>Epilachna varivestis</i> Mulsant	<i>Phaseolus vulgaris</i> L. (garden bean)	-

other species of genera in the tribe Doryphorini. Evidence to support this contention was provided by P. W. Schaefer (personal communication), who tested the parasite against eggs of the false potato beetle, *Leptinotarsa juncta* (Germar) and found it to be a readily acceptable host. As a result of these tests, permission was received from the Animal and Plant Health Inspection Service, USDA (APHIS) to release the parasite in Missouri in 1980 to determine the parasite's potential in the biological control of the Colorado potato beetle.

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